

Compliments

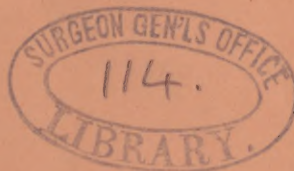
Myers (W. H.)

PUERPERAL PYÆMIA.

By WM. H. MYERS, M.D.,

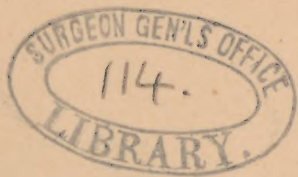
FORT WAYNE, INDIANA.

[Read before the Indiana State Medical Society, June 11, 1884]



Reprinted from the Journal of the American Medical Association
September 20, 1884.

CHICAGO:
REVIEW PRINTING CO.
1884.



PUERPERAL PYÆMIA.

It is within ten or fifteen years only that much has been done to entitle medicine to a place among the exact sciences. Up to this period we knew disease only by groups of effects; of their causes we had no certain knowledge; we dealt only with the symptoms.

As the methods of research adopted became stricter and more systematic, we have been enabled to look forward with much certainty and to offer speedy solutions of many problems hitherto deemed inscrutable, and the men of science in medicine anticipate with much hope the possibility of triumph, not merely over individual cases, but over whole genera of disease.

I have, therefore, thought I could not choose a more opportune theme than pyæmia, with its closely allied diseases, and to refer briefly to the light cast by recent discoveries upon its nature and treatment in puerperal cases.

"Pyæmia," in the language of Déspine, "is purulent absorption." As septic absorption may be confounded at the bedside with the pyæmic process, we are at once compelled to define the distinctive characteristics of each.

To Burdon-Sanderson we are indebted for the following clear definition of pyæmia:

"It is a process which has a beginning and a termination of a definite kind, a center of origin, lines of diffusion, and secondary results. It is developed and goes on and on to its fatal end."

Septicæmia has no necessary connection with any local process. It is, therefore, not developed, but is

a constitutional disorder of limited duration, produced by the entrance into the blood-stream of a certain quality of septic material.

You will apprehend from the foregoing, that I do not use the terms pyæmia and septicæmia as convertible. I believe that a sharp line of definition between these two conditions exists.

You cannot have pyæmia without pus, and you cannot have pus without inflammation, as pus is one of the products of inflammatory action, and whether its absorption be from an abscess, an open wound or a solution of continuity of the uterine surface or its appendages, it results in the pyæmic processes.

With Jonathan Hutchinson, pyæmia, I hold, is produced by an inflammation of the patient's own tissues.

But I imagine some may controvert the opinions here expressed, by referring to Waller, Cohnheim, Virchow and others, who state that pus is nothing but a white blood globule, strayed outside of a capillary vessel, and that no property or power can with certainty be ascribed to the white blood-cell but which is certainly predicable of the pus-cell.

As anatomical elements they offer no points of distinction. Their chemistry is the same. To both is accorded the property of growth and multiplication by subdivision. Neither of them contribute to the formation of any higher structure. Neither of them eventuate in anything different from cells; as Beale would say, "masses of germinal matter, but as such live, die and disintegrate." Whilst the presence of pus may be considered as the approximate cause of the pyæmic processes, yet it alone, as such, cannot produce all of the symptoms present in pyæmia. The exciting cause of pyæmia has been a matter of dispute for hundreds of years, but that the antiseptic treatment has almost driven pyæmia from the hospital wards is a matter of fact, and that its disappearance,

coincident with the introduction of Listerism in surgery and obstetrics, leads us to hope that a solution of this hitherto unexplained question as to its origin is not far distant, and that probably the statement of Burdon-Sanderson, that "pyæmia originates by the introduction into the living tissues and eventually into the blood, of a poison which is itself a product of inflammation"; and that the metastatic abscesses are characterized by the presence of bacteria, may be regarded as the solution.

A predisposing cause in disease may be defined as a cause which, whilst not producing disease itself, renders more effective the exciting cause; and under this head we must include the environment of the patient, shock, loss of blood and depression of the vital powers. For instance, if you take a large series of cases of patients who have lost great quantities of blood, or are debilitated, or greatly depressed, many of them will be the victims of pyæmia. Historic mention of this is made by military surgeons. It was so in the Crimea and in the French campaign. In our own Rebellion the Confederate soldiers suffered more after their defeats. In the Franco-Prussian war pyæmia was less prevalent in the German army, they being the victors, than in the French, they being the vanquished.

Let me now direct your attention to puerperal pyæmia, and the evidence that any morally as well as physically depressing cause is discovered to coöperate in the same way. Dr. Newman, in discussing puerperal pyæmia, uses the following language in speaking of the predisposing causes above referred to: "These do unquestionably seem to me to play a material part, at all events, in predisposing the system to the virulent development of these poisons however they happen to be introduced."

Hicks says: "There is another point which cannot be left out of consideration, viz.: that violent

mental emotions also are followed by symptoms precisely similar to those which followed zymotic influences or the existence of putrid discharges."

The puerperal condition itself may be considered as a predisposing cause, and is so referred to by the ablest writers.

If we look at what a lying-in woman is, we see there a peculiar constitution ready to receive poison and ready for those poisons to ferment, and so on to a disastrous issue.

Richardson in speaking of this condition of the woman after delivery says, that she is in a nervous condition supplying from her own potential energy the movements of the fœtus. Then there are cases where there has been some local injury, exposure of cellular tissue, the rupture or exposure of a vein, the formation of a modified secretion, the absorption of that and death from what Mr. Hutchinson correctly calls poisoning immediately from the patient herself.

Grailly Hewitt thus graphically describes the condition of a woman immediately after parturition, as a predisposing cause of pyæmia: "The woman has a large bleeding for instance, at the time of child-birth; the contractile power of the uterus fails to a certain extent, the expulsion of the debris ceases, and it is taken up into the circulation, and I explain in this way those cases in which the scarlet fever poison and other fever poisons apparently produce disease. They destroy the vitality of the patient to a certain extent; they take away the safeguard; they abolish the contraction of the uterus and they produce paralysis of the organ for the time being and the pyæmic process immediately takes possession of the uterine sinuses."

Let me here direct your attention to the fact that these cases are often auto-genetic; that the woman is herself the factor, and subsequently the recipient of

the poison generated "*in utero*" which is received into the lymphatics, the veins, the peritonæum, and into the body generally. In this morbid uterine condition, usually the result of hæmorrhage, followed by a loss of vitality and contractile power, I would grasp the soft, spongy, uncontracted uterus with my hands, compress it, thereby expelling clots; afterwards wash out putrid or putrescent discharges of the womb and vagina, by means of Higgins' syringe, Condyl's Fluid and warm water with carbolic acid, until the lochia became quite inodorous; this operation I would repeat every two hours if the temperature should reach 102° Fah.

Now let us pause here a moment. For in every professional life in medicine there are times and events well calculated to *cause* us to pause and sometimes review the line of treatment suggested by even the most advanced therapeutists and clinicians; and we are often compelled to express strong doubts amid disappointments. These mental states are thrust upon us, and we reconsider carefully the factors, thus profoundly impressing us, either by disaster or unexpected recovery.

Professor A. S. Ranney, speaking upon this subject with its attendant disappointments, says, "It brings up recollections of frustrated hopes, of untimely graves, of surgical skill carefully exercised, but of no avail."

Professor Krakowizer also says:

"It is bad enough that the surgeon, the obstetrician, find inherent difficulties in the treatment of wounds and in the management of abnormal labor; that they cannot help sometimes making mistakes, in choosing the time for operations and in performing them, but it is discouraging to have to take an element into calculation in performing one's professional duty, that neither lies in the nature of the case nor

can be warded off by any degree of scientific acumen or skill."

These reflections of my own and of the authorities just quoted, have been profoundly impressed upon my mind by the following case:

On the 24th day of December, 1883, Mrs. E., æt. 30, was one of the passengers in a railway car, as it was on a crossing a rapidly advancing locomotive struck the car with great violence; overturning it. She was thrown against the seat and sides of the coach; upon my arrival, I found Mrs. E. laboring under shock, mental and physical, the latter the result of numerous cuts about the head, and abdominal bruises. At the time of the accident she was *enciente* six months; she was conveyed to her home, a distance of one mile, and properly placed in bed, where she remained for nearly two weeks, during which time she had a slight uterine hæmorrhage for the first few days, and during the remaining time was strongly threatened with premature labor, but this was averted by quiet and strict horizontality. During the remaining period of her term, she always complained of pain over the right lumbar region. Her confinement occurred March 13, 1884.

Nothing unusual occurred in the first and second stages of labor, only they were more protracted than in her two previous labors, in which I attended her. The protraction seemed to be owing to the failure of nervous power. In the third, the stage of expulsion of the placenta, (and this itself may be divided into three different periods, first, detachment from the internal surface of the uterus; second, expulsion into the vagina, and third, protrusion externally), after waiting the usual time, and finding that the diminution of the womb did not occur as is usual in this stage, I was apprehensive that the placenta was adherent to the surface of the uterus.

During the interim usually allowed, between the

birth of the child and the placental delivery—fifteen or twenty minutes—a severe hæmorrhage ensued, and this determined my prompt interference to aid in the expulsion of the placenta, first by Crede's method ; failing in this and fearing the further loss of blood, I proceeded to deliver by following up the cord, and found my apprehensions verified, that the placenta was adherent. It was firmly attached at its lower edge to the uterine wall.

Pressing firmly with my left hand externally over the fundus uteri, I carried the fingers of my right hand between the placenta and the internal surface of the uterus, and thus destroyed the adhesions and liberated the placenta without force and with the greatest possible care. Its expulsion now followed. No laceration of the cervix or perinæum was detected, and I do not believe any existed. After being properly put in bed, fluid extract of ergot was administered in large doses every hour, to prevent hæmorrhage by promoting uterine contractions. I was informed the next morning that several clots had been expelled during the night, and that she had remained free from any urinary distress. I entertained grave fears for my patient, fearing that the pyæmic process would be set up in that portion of the placental site where the adhesions had been broken up, and also that the nervous prostration from previous shock and the loss of blood occurring in the third stage of her labor, would act as powerful predisposing causes. Under these impressions, I strictly observed every antiseptic precaution, from the first of her labor.

A healthy male child was born on the 13th, as previously stated. She progressed favorably until the 21st (eight days), when at 1 P. M. a messenger informed me that she had a most violent rigor, with profuse perspiration. Being at the time ill, I was unable to respond to the call, and Dr. H. V. Sweringen was called, and reported that the temperature was

106°, that five hours afterward the temperature was 101°. Now followed in succession, usually twice in twenty-four hours, rigors, profuse perspiration, sharp elevated temperature, varying from 105° to 100°, during the remaining days of her illness. It was now believed by us to be a well-pronounced case of pyæmia, and we adopted the treatment suggested by our best clinicians. That this was a case of auto-genetic pyæmia was evident from the history of the case, using the term auto-genetic "self," "I generate," and applying it in diseased conditions in the same sense as originally used by Owen in anatomy, elements developed from distinct centres. In biology, development refers to an unfolding, and refers to the organic changes which occur in a living germ.

I have already expressed my own belief that the presence of pus alone did not establish the pyæmic process, but that there was something special in the state of the patient's health which led to the disastrous result; the previous shock which she sustained, and from which she had not recovered at the time of her accouchement, the loss of blood at that time, and the adherent placenta were the fatal factors that invited blood-poisoning.

Cheyne in his *Antiseptic Surgery* teaches us that the following conclusions were forced upon him by the results of numerous experiments; that the blood and tissues of healthy living animals do not contain organisms or their spores, and have no inherent tendency to undergo fermentation.

LIFE IS THE GREAT ANTISEPTIC!

Preserve it, restore healthy functions, control by rest and position, the nervous vascular and muscular action, and the repair of injuries proceeds like healthy nutrition. Life and putrefaction are not correlative but antagonistic, and in proportion as we utilize and economize the attributes of life we will find ourselves

independent of those changes which are inherent to decomposing organic matter. Lister suggests that the tissues of a healthy living body have a power of counteracting the energies of bacteria in their vicinity and preventing their development. Specific diseases are like specific forms of animal or vegetable life; they can be produced only by specific preëxisting germs. There is no such thing as spontaneous generation of the entities which generate disease any more than there is of the innumerable forms of animal life which make their appearance wherever a material suitable for their development is exposed to the atmosphere. We know that the air is full of floating living particles, ready to spring into activity whenever they may light upon a congenial soil. In such numbers do they exist that present but the proper soil, and the appropriate germ inevitably finds its way to it. Each particular malady is due then to the invasion of the system by some microscopic organism, which multiplying itself within the living body, gives rise to the phenomena which physicians describe as the disease. This is the teaching of McLagan in his *Germ Theory of Disease*. This is true also of certain diseased conditions, as in the case of wounds. It is now believed that when they are other than normal that it is owing to the invasion from without of living organisms, and that the constitutional disturbances previously regarded as the natural consequence of every severe wound or surgical operation were really dependent on the introduction of air-carried germs, of living organisms into them, and that in their absence, healing by the first intention is certain to occur. But we are told by those who doubt Listerism, that if there be any truth in the theory, these air-born germs should settle and multiply themselves in every cut or solution of continuity and that the danger from the most trifling incisions should be as great as it is from the most serious. To this we

reply, by presenting a most important fact in connection with the micro-organisms to which these germs give rise without which the higher forms of animals which they infest must speedily succumb before their attacks. If their invasion is undertaken in insufficient force, or upon an animal in robust health, they are refused a foothold and expelled, or if they have secured a lodgment in the tissues they are laid hold of and digested by them: this fact has been repeatedly observed and demonstrated by Cameron, Lister, Billroth and Cheyne. They have also proved by experiment that an undisturbed healthy coagulum in the vicinity of living tissues will resist the development of putrefactive bacteria even when present in a highly concentrated form. In illustration let us apply these statements or facts to surgical procedures and they will explain the success which has attended important operations without antiseptic precautions, notably does this apply to ovariectomy.

In 1874, I removed an ovarian tumor from a patient æt. 36 years. The tumor weighed 45 pounds. From my notes of the case, I read that the rebound to health was rapid and complete. This may be attributed partially to the preparatory treatment and the complete isolation of the patient with absolute rest. No antiseptic precautions were used except cleanliness. In this case I now believe the recovery was largely due to the high vital energy of the peritoneal surface. We all know how rapidly a wound in the peritonæum may heal or the rapid peopling of the lymph in the wound with vigorous new living elements; for the formation of lymph proceeds more rapidly in proportion as the wounded tissues are in a more vigorous condition. Hence, the power of organizing blood-clot or lymph to resist the development of putrefactive bacteria. This high vital endowment of the peritonæum is of wide application in abdominal surgery, and explains the remarkable suc-

cess of Lawson Tait—three deaths in his last 50 cases without the use of carbolic acid—and the same remark may be applied to Professor Keith, of Edinburgh.

Primary union or union by the first intention, can then only occur in a healthy wound, and the phenomenon of union in this manner is explained by the resisting power of the tissues preventing the development of putrefactive bacteria.

Dr. Antonine Magnin, in his work on Bacteria—page 443—in chapter on “Bacteria in Surgical Lesions,” says: “The blood and tissues of healthy persons do not, under ordinary circumstances, contain bacterial organisms,” and that “putrefactive decomposition of organic fluids is due to bacterial organisms.” This doctrine is also sustained by Watson Cheyne in the following language: “The blood and tissues when in a healthy state have the power, of themselves, of destroying organisms when these are introduced into the body.”

In discussing the destroying action of the healthy living tissues on bacteria he particularly refers to perfect mechanical rest, and by attention to the general health, stating when the tissues are in perfect health and the clot is undisturbed, and when kept in such a state they resist the development of organisms without any antiseptic appliance, and the wounds heal frequently by first intention. He asks the question, “How is it that union by the first intention can occur when during the operation organisms enter the wound, both as dust from the air, also from the water in which the sponges are soaked, when there is also between the cut surfaces a layer of blood or lymph; how is it that blood does not putrefy between the cut surfaces of a wound?” He answers these questions by quoting the following forcible arguments from Lister, who says: “The fact is, that a thin layer of blood, although containing numerous causes

of putrefaction, does not, as a rule, putrefy if it be placed between two healthy living cut surfaces." Or, to state the fact in another way, "these organisms, which are certainly present, cannot develop in a thin layer of blood or lymph placed between two healthy living freshly cut surfaces;" or, again, "the living tissues when in a healthy state have the power of preventing the development of organisms in their immediate vicinity.

Watson Cheyne, in his valuable work on Antiseptic Surgery, again says that "he has demonstrated that if into a *healthy* living animal a small quantity of ordinary bacterial fluid be injected, the bacteria lose their vitality and disappear; also, that organisms cannot be found in the living healthy body, unless a considerable amount of their products be introduced along with them." On the other hand, he has demonstrated how, if the animal were out of health, organisms could live in the blood and tissues much more easily. The same is the case in union by the first intention. If the part be of high vital power, and in a healthy state, and if there be an extremely small quantity of blood between the cut surfaces, union by first intention will almost certainly occur. If the part become inflamed, or if the patient be in a weak state of health, union by first intention, without aseptic means, becomes a matter of great uncertainty.

Cheyne states that Traube and Gscheilden have found that blood taken with precaution from a healthy living rabbit, into which twenty-four or forty-eight hours previously $1\frac{1}{2}$ c. cm. of bacterial fluid had been injected, could be kept for months without undergoing putrefaction. He adds: "The facts that the blood and tissues of healthy living animals do not contain living organisms, show sufficiently that they have the power of destroying them, for otherwise there are frequent opportunities for the entrance of these into the circulation."

That one of the factors predisposing to pyæmia in Mrs. E.'s case was the adherent placenta, mental perturbation, hæmorrhage with shock, we can no longer doubt, from the light thrown upon bacterial development as not occurring in healthy living tissue, and we pass to the consideration of the adherent placenta in her case. Why was it adherent? That this adhesion is unusual, rarely met with by the most experienced in our profession, will be admitted; but as it did occur, to what is it attributable? Drs. Rhamsbotham, Burns, Davis, Ingleby and Hamilton attribute it to the presence of lymph thrown out as a product of inflammatory action, and that the inflammation is usually excited by falls, blows or injury received during gestation, and advance in support of this theory that in the lower classes it is much more frequent than in the higher circles, this being due to their greater liability to accident.

Is it possible to remove entirely the adherent portions of the placenta?

So strongly specialized is the fatality following this adhesion that I unhesitatingly answer the question in the negative. The exceptions being a mere trace in medical literature.

Sir J. Y. Simpson in speaking of the adherent placenta says: "In some instances the organic union between them is so firm and the corresponding surface of the uterus and placenta are so intimately blended together that the uterine contractions are altogether inadequate to break up the morbid organic connection existing between them, and occasionally it has been found impossible to disunite them completely from one another by any manual efforts during life or even by dissection after death."

Playfair, speaking of the treatment of adherent placenta, says: "The removal is always a delicate and anxious operation, which, however carefully performed, must of necessity expose the patient to the

risk of injury to the uterine structures, and of leaving behind portions of placental tissues." He also says that "the retained portions may decompose, give rise to fetid discharge and septic infection," and that, "such cases must be treated by antiseptic intra-uterine injections."

Meadows advises "that if the adhesion be so intimate that considerable force is necessary for separating it, it is far better to leave a portion adherent, and in such a case the vagina, and even the uterus should be washed out frequently with disinfecting fluids, such as Condly's solution."

Hamilton, in his *Outlines*, says of the adherent placenta: "Of all the cases of retention this is the most difficult and dangerous; the case is intricate and perplexing."

Denman, in speaking of the placental adhesion to the uterine wall says: "A perfect separation will be extremely difficult and sometimes impossible."

Similar views are entertained by Chaillly, Burns, Davis, and Rodney Glisson. We may conclude this part of the subject by quoting David D. Davis, in his *Principle and Practice of Midwifery*, vol. ii, p. 1062: "In the treatment of this form of retention of the placenta, the proper, and indeed the only safe practice to be adopted, is to withdraw by careful detachment all of the placenta that is found not morbidly adherent to the uterine parietes, leaving the diseased remainder to such kindly offices of nature as she may be able to exert for their expulsion."

The above treatment is strongly sustained by the late Professor Hugh L. Hodge, of the University of Pennsylvania in his *Principles and Practice of Obstetrics*. He says: "Should the adhesions be very close, the accoucheur should content himself with lacerating the placenta, and bringing away as much of the mass as possible."

The rigor occurred on the eighth day after her de-

livery, and was due undoubtedly to pus, or its constituents, being poured into the blood. At this period according to Wenheimer, the microscopical constituents of the lochia are no longer serous, but consist of pus corpuscles, and they are the paramount constituent. It was at this period that pyæmia supervened, owing to the presence of pus, as a natural result of inflammatory action, rendered infective by the vital depression of the patient. Had her condition been otherwise, in accordance with the principle discovered by Lister, and which is now generally admitted, viz.: that the tissues of a healthy living body have a power of counteracting the energies of bacteria in their vicinity and preventing their development—a favorable prognosis might have been predicted.

From the birth of the child to the eighth day, a compress, firm and snug-fitting binder was kept constantly applied, and ergot was administered to insure uterine contraction, and to prevent absorption of purulent products; strict quiet and cleanliness were enjoined, and the nurse instructed to use vaginal injections of carbolized water twice or three times a day. Quinine was given with proper food.

On the 21st of March, (the eighth day after her delivery) a severe rigor occurred, followed by a sharp rise of temperature. The fever took an acuminated form, for after the temperature reached the highest peak, it began immediately to fall again. This sudden turning back of temperature after reaching the maximal point, and rapid downfall of temperature, recurred several times during the twenty-four hours and became the most marked feature in the case. Thomas thus alludes to the fluctuations in temperature.

“In the morning the temperature would be found at 102° , in the evening of the same day 106° ; the following morning it would be 98° , and toward evening of the same day 106° and 107° . The thermom-

etric evidence is the most valuable we have, in every respect it is the most serviceable, and certainly wonderful." He thus truly describes the condition of our patient when he says: "A patient may look perfectly well in the morning, and in the evening have a temperature of 107° or 108° , which is a fact of itself to indicate to us that she is suffering from some very great disease."

These fluctuations in temperature were accompanied by a frequent pulse, 140, and hurried respiration, 44, great muscular debility, but without delirium or mental disturbance. These phenomena recurred each day until the 28th when the disease terminated fatally.

GENERAL TREATMENT.

Large doses of quinine, ten or fifteen grs. every six hours, beef essence and stimulants in large quantities, iodoform internally, as recommended by Professor Maggioli of Rome, frequent ablutions and speedy removal of all sources of infection, complete ventilation and the free use of carbolic acid.

SPECIAL TREATMENT.

As all possible sources of the poison should be removed, and where these consist of decomposing retained substances within the uterus or vaginal canal, it would be natural to suppose that intra-uterine injections would suggest themselves, and brilliant results are reported as having followed this special line of treatment. Renewal of the infection is thereby often rendered impossible, and if the case be one complicated by retention of clots or portions of an adherent placenta, this treatment is said to be especially serviceable.

Schonlein directs that in all cases where a recently-delivered woman has an offensive discharge from the uterus or an increase of temperature, he at once directs intra-uterine injections consisting of carbolized water. He publishes a table of 1,200 cases, for

the purpose of demonstrating the great benefits derived therefrom.

Richter administered intra-uterine injections to 3,000 lying-in women without a single accident. If there be premature cessation of the lochia, with constitutional disturbance, a purulent discharge, fœtid, and with increase of temperature, or if the uterus contain fragments of placenta, clots, or is imperfectly contracted, intra-uterine injections should invariably be used.

Dr. W. Gilwylis says: "If after labor a chill be followed by a rapid rise of temperature, I would wash out the uterine cavity with a solution of carbolic acid, one to twenty."

Dr. Grailly Hewitt uses carbolic acid by intra-uterine injections in all cases of pyæmia, and insists upon the necessity of drainage of the vagina by alteration of position.

Prof. Tarnier, of Paris, as a germicide uses bichloride of mercury solution, 1 to 1,000. He uses intra-uterine injections in pathological conditions only.

You are all, no doubt, perfectly familiar with the discussion before the New York Academy of Medicine, and with positions notably taken by Professors Barker and Thomas. It is not deemed necessary to allude to them specifically, only that Thomas is a strong advocate for carbolic acid, to be used freely and frequently in intra-uterine injections, while Barker deems these precautions as unnecessary, and sometimes positively injurious.

In looking over the literature of this subject I have failed to find any reasons given for the frequent intra-uterine injections of carbolic acid. It is true, we are informed the acid is a germicide, that it will destroy the organisms; and it is to this part of the subject that I will invite your closest attention for a few moments.

Microbe is a word for various minute organisms found in the fluids or tissues of the body in pyæmia and other diseased conditions.

They consist of cells of different sizes and shapes, which multiply themselves with enormous rapidity. Let it be distinctly enunciated that the doctrine of spontaneous generation is dead, and that it is established beyond dispute that the most putrescible bodies exposed to contact with the atmospheric air will remain unputrefied if preserved from contact with microbes or germs. Also, it is proven that the most extraordinary differences exist between the tenacity of life exhibited by the developed microbes and the spores or forms from which they spring.

Submit the microbes to boiling heat and they are killed; dry them and they die at once; expose them to oxygen and they perish; carbolic acid will paralyze them; expose any of them to oxygen under high pressure and they die.

Antiseptic agents kill them.

But the spores which they produce and from which they spring, are almost indestructible. Dryness only enables them to resist destruction; time is no object, for their dormant vitality is maintained for years. They have survived the boiling process for eight hours. Their immediate destruction is by the flame of the spirit lamp only, and yet we believe and teach that germs are readily destroyed by mild solutions of carbolic acid, bi-chloride of mercury, chloride of zinc, and permanganate of potass., and that by the effective application of the agents above mentioned, we can protect our patients against the mischief they work. If this be true, and no one will deny the statement who is well qualified to pronounce judgment, it seems to me to be a most important point to be carefully considered in treatment of cases in medicine, surgery and obstetrics.

Now, let us refer to the experiments of Prof. Tyn-

dall, and see if they do not offer the solution to the phenomena referred to. He took infusions, infected with spores derived from old hay, on which many hours of continuous boiling had no effect, but found that by boiling for a single minute at intervals of a few hours, he could, with an aggregate of five minutes' boiling, sterilize the most refractory infusion. And now follows the explanation: The spores in an infusion are in different conditions as to species, age, humidity, dessication, exposure to light and heat.

They will require different periods for germination ; while they remain simple spores, they resist boiling because they are endued with the most robust vitality. But allow them to germinate, and deal with each successive crop as it is springing into life, and your victory is complete and of the easiest. It is in this manner that germicides accomplish all that is claimed for them. They kill the developed microbe, and prevent the development of others. They will kill them off in detail, as they spring into life or are developing into maturity.

You will now apprehend why I believe in the antiseptic intra-uterine injections in those pathological lesions tending to develop the pyæmic process ; by the *repeated* application of carbolized solutions we destroy the microbes as they germinate, and hence it is now easy to comprehend the success claimed so recently by Prof. Thomas, by this method, and the reason why the almost unceasing intra-uterine injections are necessary to arrest the pyæmic process.

In the above I have presumed the connection of cause and effect as existing between microbes and the diseases with which they are found associated.

Of the methods by which it can be proved that they really stand to each other in this relation, I have only to refer to the proofs offered by Burdon-Sanderson, Koch, Pasteur, Toussaint.

